

Voltaic Currents Determined by Heat 279

believe, which are able to produce thermo currents with some of the metals, and not with others. Further, these metals, copper, silver, etc., do not always show effects which can be mistaken or pass for thermo-electric, for silver in hot dilute nitric acid is scarcely different from silver in the same acid cold (938); and in other cases, again, the hot metals become negative instead of positive (941).

Cases of one Metal and one Electrolyte ; one Junction being heated

930. The cases I have to adduce are far too numerous to be given in detail; I will therefore describe one or two, and sum up the rest as briefly as possible.

931. *Iron in diluted sulphuret of potassium.*—The hot iron is well positive to the cold metal. The negative and cold wire continues quite clean, but from the hot iron a dark sulphuret separates, which becoming diffused through the solution discolours it. When the cold iron is taken out, washed and wiped, it leaves the cloth clean; but that which has been heated leaves a black sulphuret upon the cloth when similarly treated.

932. *Copper and the sulphuretted solution.*—The hot copper is well positive to the cold on the first immersion, but the effect quickly falls, from the general causes already referred to (906).

933. *Tin and solution of potass a.*—The hot tin is strongly and constantly positive to the cold.

934. *Iron and dilute sulphuric acid* (923).—The hot iron was constantly positive to the cold, 60° or more.

Iron and diluted nitric acid gave even a still more striking result.

I must now enumerate merely, not that the cases to be mentioned are less decided than those already given, but to economise time.

935. *Dilute solution of yellow sulphuret of potassium*, consisting of one volume of the strong solution (800), and eighteen volumes of water.—Iron, silver, and copper, with this solution, gave good results. The hot metal was positive to the cold.

936. *Dilute solution of caustic potassa* (920).—Iron, copper, tin, zinc, and cadmium gave striking results in this electrolyte.

The hot metal was always positive to the cold. Lead produced the same effect, but there was a momentary jerk at the galvanometer.

meter at the instant of immersion, as if the hot lead was negative at that moment. In the case of iron it was necessary to continue the application of heat, and then the formation of oxide at it